

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A method of confirming a battery charge amount and degradation state, comprising:

a first step of measuring or calculating at a plurality of battery temperatures a cycle test battery in respect of battery internal and surface temperatures and one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at prescribed time intervals substantially until an end of life of the cycle test battery;

a second step of using measured or calculated values to generate a determination table showing relationships between charge amounts and degradation states at said prescribed time intervals;

a third step of measuring or calculating a subject battery in respect of said battery internal and surface temperatures and said one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging; and

a fourth step of comparing determination table values with said battery internal and surface temperatures and at least one measured or calculated value of the subject battery to make a primary confirmation of a present subject battery charge amount and degradation state in accordance with a determination table location of matching values and to make an overall confirmation of results of the primary confirmation based on an appearance ratio of said determination table location, thereby estimating said present subject battery charge amount and degradation state.

Claim 2 (Withdrawn): A method of confirming battery charge amount and degradation state, comprising the steps of:

measuring at a plurality of battery temperatures a cycle test battery at predetermined time intervals substantially until battery end of life, using measurement values of at least two selected from battery open voltage, current and voltage during discharge, and current and voltage during charging;

using measured values to generate determination tables showing relationships in each case between prescribed charge amounts and prescribed degradation states;

measuring a subject battery in respect of said at least two selected from battery open voltage, current and voltage during discharge, and current and voltage during charging; and

comparing determination table values with each of measured values of the subject battery to confirm present subject battery charge amount and degradation state in accordance with determination table locations of matching values, and simultaneously using an incidence of appearance at determination table locations resulting from the measured values to estimate present subject battery charge amount and degradation state.

Claim 3 (Original): The method according to claim 1, in which a value of the battery open voltage is an average value of measurements made at fixed time intervals.

Claim 4 (Withdrawn): The method according to claim 2, in which a value of the battery open voltage is an average value of measurements made at fixed time intervals.

Claim 5 (Original): The method according to claim 1, in which the measurement of the voltage and current during discharge in a constant current discharge circuit comprises the steps of:

measuring battery voltage;

after discharge starts, measuring battery voltage a plurality of times at fixed time intervals;

measuring discharge current a plurality of times at fixed time intervals simultaneously with the step of measuring battery voltage a plurality of times; and

after terminating the discharge, measuring battery voltage a plurality of times at fixed time intervals.

Claim 6 (Withdrawn): The method according to claim 2, in which the measurement of the voltage and current during discharge in a constant current discharge circuit comprises the steps of:

measuring battery voltage;

after discharge starts, measuring battery voltage a plurality of times at fixed time intervals;

measuring discharge current a plurality of times at fixed time intervals simultaneously with the step of measuring battery voltage a plurality of times; and

after terminating the discharge, measuring battery voltage a plurality of times at fixed time intervals.

Claim 7 (Original): The method according to claim 1, in which the measurement of battery voltage and current during discharge, and a measurement of time, in a constant current, constant voltage discharge circuit comprise the steps of:

measuring battery voltage;

subtracting a predetermined voltage from the measured battery voltage to set a constant voltage discharge value;

measuring a time from a start of the discharge until the set constant voltage discharge value is attained;

after the start of the discharge, measuring discharge current a plurality of times at fixed time intervals; and

terminating the discharge.

Claim 8 (Withdrawn): The method according to claim 2, in which the measurement of battery voltage and current during discharge, and a measurement of time, in a constant current, constant voltage discharge circuit comprise the steps of:

measuring battery voltage;

subtracting a predetermined voltage from the measured battery voltage to set a constant voltage discharge value;

measuring a time from a start of the discharge until the set constant voltage discharge value is attained;

after the start of the discharge, measuring discharge current a plurality of times at fixed time intervals; and

terminating the discharge.

Claim 9 (Original): The method according to claim 1, in which the measurement of current and voltage during constant current charging comprises the steps of:

measuring battery voltage;

after the step of measuring the battery voltage, starting the charging and measuring battery voltage when the charge current is changed a plurality of times at fixed time intervals;

measuring the charge current when the charge current is changed a plurality of times at fixed time intervals; and

terminating the charging.

Claim 10 (Withdrawn): The method according to claim 2, in which the measurement of current and voltage during constant current charging comprises the steps of:

measuring battery voltage;

after the step of measuring the battery voltage, starting the charging and measuring battery voltage when the charge current is changed a plurality of times at fixed time intervals;

measuring the charge current when the charge current is changed a plurality of times at fixed time intervals; and

terminating the charging.

Claim 11 (Original): The method according to claim 1, in which the measurement of current and voltage, and a measurement of time, during constant current, constant voltage charging comprise the steps of:

measuring battery voltage;

adding a predetermined voltage to the measured battery voltage to set a constant voltage charging value;

starting the charging after setting the constant voltage charging value;

measuring a time at which the set constant voltage charging value is attained;

measuring the charge current a plurality of times at fixed time intervals; and

terminating the charging.

Claim 12 (Withdrawn): The method according to claim 2, in which the measurement of current and voltage, and a measurement of time, during constant current, constant voltage charging comprise the steps of:

measuring battery voltage;

adding a predetermined voltage to the measured battery voltage to set a constant voltage charging value;

starting the charging after setting the constant voltage charging value;

measuring a time at which the set constant voltage charging value is attained;

measuring the charge current a plurality of times at fixed time intervals; and

terminating the charging.

Claim 13 (Original): The method according to claim 1, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 14 (Withdrawn): The method according to claim 2, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 15 (Original): The method according to claim 3, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 16 (Withdrawn): The method according to claim 4, in which ambient temperature during the step of measuring the cycle test battery to generate the determination

table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 17 (Original): The method according to claim 5, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 18 (Withdrawn): The method according to claim 6, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 19 (Original): The method according to claim 7, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 20 (Withdrawn): The method according to claim 8, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 21 (Original): The method according to claim 9, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and

during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 22 (Withdrawn): The method according to claim 10, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 23 (Original): The method according to claim 11, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 24 (Withdrawn): The method according to claim 12, in which ambient temperature during the step of measuring the cycle test battery to generate the determination table and during the step of measuring the subject battery, is measured a plurality of times at fixed time intervals.

Claim 25 (Withdrawn): In an apparatus that confirms battery charge amount and degradation state in which

values of a determination table showing relationships between prescribed charge amounts and prescribed degradation states based on measurements, at a plurality of battery temperatures, of a cycle test battery in respect of at least one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at predetermined time intervals substantially until battery end of life, and

a measured value of a subject battery in respect of the same one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging, are compared and present subject battery charge amount and degradation state are confirmed in accordance with a determination table location of matching values, an apparatus for measuring open voltage in a battery, comprising at least: a trigger signal circuit that generates a signal at fixed time intervals to operate a voltmeter; a timer for setting the time intervals at which the trigger signal circuit generates the signal; and a counter for pre-setting a number of times the trigger signal circuit generates the signal.

Claim 26 (Withdrawn): In an apparatus that confirms battery charge amount and degradation state in which

values of a determination table showing relationships between prescribed charge amounts and prescribed degradation states based on measurements, at a plurality of battery temperatures, of a cycle test battery in respect of at least one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at predetermined time intervals substantially until battery end of life, and

a measured value of a subject battery in respect of the same one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging, are compared and present subject battery charge amount and degradation state are confirmed in accordance with a determination table location of matching values, an apparatus for measuring battery current and voltage during discharge, comprising at least:

a trigger signal circuit that generates a signal at fixed time intervals to operate a voltmeter and an ammeter;

a pulse-discharge generation circuit that discharges a battery at fixed time intervals;

a timer for setting time intervals at which the trigger signal circuit generates the signal and the pulse-discharge generation circuit discharges the battery; and

a counter for pre-setting a number of times the trigger signal circuit generates the signal and the pulse-discharge generation circuit discharges the battery.

Claim 27 (Withdrawn): In an apparatus that confirms battery charge amount and degradation state in which

values of a determination table showing relationships between prescribed charge amounts and prescribed degradation states based on measurements, at a plurality of battery temperatures, of a cycle test battery in respect of at least one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at predetermined time intervals substantially until battery end of life, and

a measured value of a subject battery in respect of the same one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging,

are compared and present subject battery charge amount and degradation state are confirmed in accordance with a determination table location of matching values,

an apparatus for measuring constant current, constant voltage discharge of a battery, comprising at least:

a trigger signal circuit that generates a signal at fixed time intervals to operate a voltmeter and an ammeter;

a constant current, constant voltage discharge circuit that discharges a battery at fixed time intervals;

a timer for setting time intervals at which the trigger signal circuit generates the signal and the constant current, constant voltage discharge circuit discharges the battery;

a counter for pre-setting a number of times the trigger signal circuit generates the signal and the constant current, constant voltage discharge circuit discharges the battery; and

a time-measurement circuit for measurement of time from start of discharge to a set fall in voltage.

Claim 28 (Withdrawn): In an apparatus that confirms battery charge amount and degradation state in which

values of a determination table showing relationships between prescribed charge amounts and prescribed degradation states based on measurements, at a plurality of battery temperatures, of a cycle test battery in respect of at least one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at predetermined time intervals substantially until battery end of life, and

a measured value of a subject battery in respect of the same one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging,

are compared and present subject battery charge amount and degradation state are confirmed in accordance with a determination table location of matching values,

an apparatus for measuring battery current and voltage during charging, comprising at least:

a trigger signal circuit that operates a voltmeter and an ammeter by generating a signal at fixed time intervals;

a constant current, constant voltage charging circuit that charges a battery at fixed time intervals;

a timer for setting time intervals at which the trigger signal circuit generates the signal and the constant current, constant voltage charging circuit charges the battery; and

a counter for pre-setting a number of times the trigger signal circuit generates the signal and the constant current, constant voltage charging circuit charges the battery.

Claim 29 (Withdrawn): In an apparatus that confirms battery charge amount and degradation state in which

values of a determination table showing relationships between prescribed charge amounts and prescribed degradation states based on measurements, at a plurality of battery temperatures, of a cycle test battery in respect of at least one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at predetermined time intervals substantially until battery end of life, and

a measured value of a subject battery in respect of the same one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging,

are compared and present subject battery charge amount and degradation state are confirmed in accordance with a determination table location of matching values,

an apparatus for measuring constant current and constant voltage charging of a battery, comprising at least:

a time-measurement circuit for measurement of time from start of charging to a set rise in voltage;

a trigger signal circuit that generates a signal at fixed time intervals to operate a voltmeter, an ammeter and the time-measurement circuit;

a constant current, constant voltage charging circuit that charges a battery at fixed time intervals,

a timer for setting time intervals at which the trigger signal circuit generates the signal and the constant current, constant voltage charging circuit charges the battery, and

a counter for pre-setting a number of times the trigger signal circuit generates the signal and the constant current, constant voltage charging circuit charges the battery.

Claim 30 (Withdrawn): In an apparatus that confirms battery charge amount and degradation state in which

values of a determination table showing relationships between prescribed charge amounts and prescribed degradation states based on measurements, at a plurality of battery temperatures, of a cycle test battery in respect of at least one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at predetermined time intervals substantially until battery end of life, and

a measured value of a subject battery in respect of the same one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging,

are compared and present subject battery charge amount and degradation state are confirmed in accordance with a determination table location of matching values,

a thermistor apparatus for measuring internal and surface temperatures of a battery located in proximity to the thermistor apparatus, comprising at least:

a trigger signal circuit that generates a signal at fixed time intervals to operate a resistance meter;

a timer for setting time intervals at which the trigger signal circuit generates the signal; and

a counter for pre-setting a number of times the trigger signal circuit generates the signal.

Claim 31 (Withdrawn): A storage medium in which are stored a program of the method according to claim 1 and the determination table according to said claim.

Claim 32 (Withdrawn): A storage medium in which are stored a program of the method according to claim 2 and the determination tables according to said claim.

Claim 33 (Withdrawn): A storage medium in which are stored a program of the method according to claim 3 and the determination table according to said claim.

Claim 34 (Withdrawn): A storage medium in which are stored a program of the method according to claim 4 and the determination tables according to said claim.

Claim 35 (Withdrawn): A storage medium in which are stored a program of the method according to claim 5 and the determination table according to said claim.

Claim 36 (Withdrawn): A storage medium in which are stored a program of the method according to claim 6 and the determination tables according to said claim.

Claim 37 (Withdrawn): A storage medium in which are stored a program of the method according to claim 7 and the determination table according to said claim.

Claim 38 (Withdrawn): A storage medium in which are stored a program of the method according to claim 8 and the determination tables according to said claim.

Claim 39 (Withdrawn): A storage medium in which are stored a program of the method according to claim 9 and the determination table according to said claim.

Claim 40 (Withdrawn): A storage medium in which are stored a program of the method according to claim 10 and the determination tables according to said claim.

Claim 41 (Withdrawn): A storage medium in which are stored a program of the method according to claim 11 and the determination table according to said claim.

Claim 42 (Withdrawn): A storage medium in which are stored a program of the method according to claim 12 and the determination tables according to said claim.

Claim 43 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 1 and data for the determination table according to said claim.

Claim 44 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 2 and data for the determination tables according to said claim.

Claim 45 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 3 and data for the determination table according to said claim.

Claim 46 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 4 and data for the determination tables according to said claim.

Claim 47 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 5 and data for the determination table according to said claim.

Claim 48 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 6 and data for the determination tables according to said claim.

Claim 49 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 7 and data for the determination table according to said claim.

Claim 50 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 8 and data for the determination tables according to said claim.

Claim 51 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 9 and data for the determination table according to said claim.

Claim 52 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 10 and data for the determination tables according to said claim.

Claim 53 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 11 and data for the determination table according to said claim.

Claim 54 (Withdrawn): An information processing apparatus that downloads via the Internet a program of the method according to claim 12 and data for the determination tables according to said claim.

Claim 55 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 1 and data for the determination table according to said claim.

Claim 56 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 2 and data for the determination tables according to said claim.

Claim 57 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 3 and data for the determination table according to said claim.

Claim 58 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 4 and data for the determination tables according to said claim.

Claim 59 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 5 and data for the determination table according to said claim.

Claim 60 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 6 and data for the determination tables according to said claim.

Claim 61 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 7 and data for the determination table according to said claim.

Claim 62 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 8 and data for the determination tables according to said claim.

Claim 63 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 9 and data for the determination table according to said claim.

Claim 64 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 10 and data for the determination tables according to said claim.

Claim 65 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 11 and data for the determination table according to said claim.

Claim 66 (Withdrawn): An information processing apparatus that includes a read-only memory in which are stored a program of the method according to claim 12 and data for the determination tables according to said claim.

Claim 67 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 1 and data for the determination table according to said claim.

Claim 68 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 2 and data for the determination tables according to said claim.

Claim 69 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 3 and data for the determination table according to said claim.

Claim 70 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 4 and data for the determination tables according to said claim.

Claim 71 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 5 and data for the determination table according to said claim.

Claim 72 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 6 and data for the determination tables according to said claim.

Claim 73 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 7 and data for the determination table according to said claim.

Claim 74 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 8 and data for the determination tables according to said claim.

Claim 75 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 9 and data for the determination table according to said claim.

Claim 76 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 10 and data for the determination tables according to said claim.

Claim 77 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 11 and data for the determination table according to said claim.

Claim 78 (Withdrawn): An electronic apparatus that includes a read-only memory in which are stored a program of the method according to claim 12 and data for the determination tables according to said claim.

Claim 79 (New): A method of confirming a battery charge amount and degradation state according to claim 1, wherein the first step comprises any one of (i) a calculation of a direct current resistance BZ of the cycle test battery from a formula: $BZ = (B2v1 + B2v2 + \dots + B2vn) / [(B3i1 + B3i2 + \dots + B3in) / n]$, in which B2v1 to B2vn individually denote a battery voltage during constant current discharge, n denotes an integer of 2 or more and is applicable subsequently and B3i1 to B3in individually denote a discharge current measured at fixed time intervals, (ii) a calculation of a rate of discharge voltage decrease BRT from a formula: $BRT = (B2v1 - B2vn) / [tb1 \times (n - 1)]$, in which tb1 denotes a fixed time interval, (iii) a calculation of a return-up voltage BU following termination of discharge from a formula: $BU = B4vn' - B2vn$, in which B4vn' denotes a return battery voltage measured ultimately after termination of discharge and n' denotes an integer of 2 or more and is applicable subsequently, (iv) a calculation of a ratio BURT of the return-up voltage following the termination of discharge from a formula: $BURT = (B4vn' - B2vn) / [tb2 \times (n' - 1)]$, in

which tb2 denotes a fixed time interval after return, (v) a measurement of a time C2 to lower the voltage to a predetermined optional value varying depending on at least one of a kind of batteries and rating in constant-current constant-voltage discharge, (vi) a measurement of discharged currents C3i1, C3i2, ..., C3in at a constant time interval tc1 from the time C2 in constant-current constant-voltage discharge, (vii) a calculation of a rate of current decrease CRT from a formula: $CRT = (C3i1 - C3in) / [tc1 \times (n - 1)]$, (viii) a calculation of a direct current resistance DZ from a formula: $DZ = D1vn / D1in'$ obtained through measurements of charge voltages D1v1, D1v2, ..., D1vn and of charge currents D1i1, D1i2, ..., D1in made when changing a current at constant time intervals, (ix) a measurement of a time E2 to charge voltage to a predetermined constant value varying depending on at least one of a kind of batteries and rating in constant-current constant-voltage charging, (x) a measurement of discharge currents E3i1, E3i2, ..., E3in changed at a constant time interval te1 from the time E2 in the constant-current constant-voltage charging, and (xi) a calculation of a rate of charge current decrease ERT from a formula: $ERT = (E3i1 - E3in) / [te1 \times (n - 1)]$.